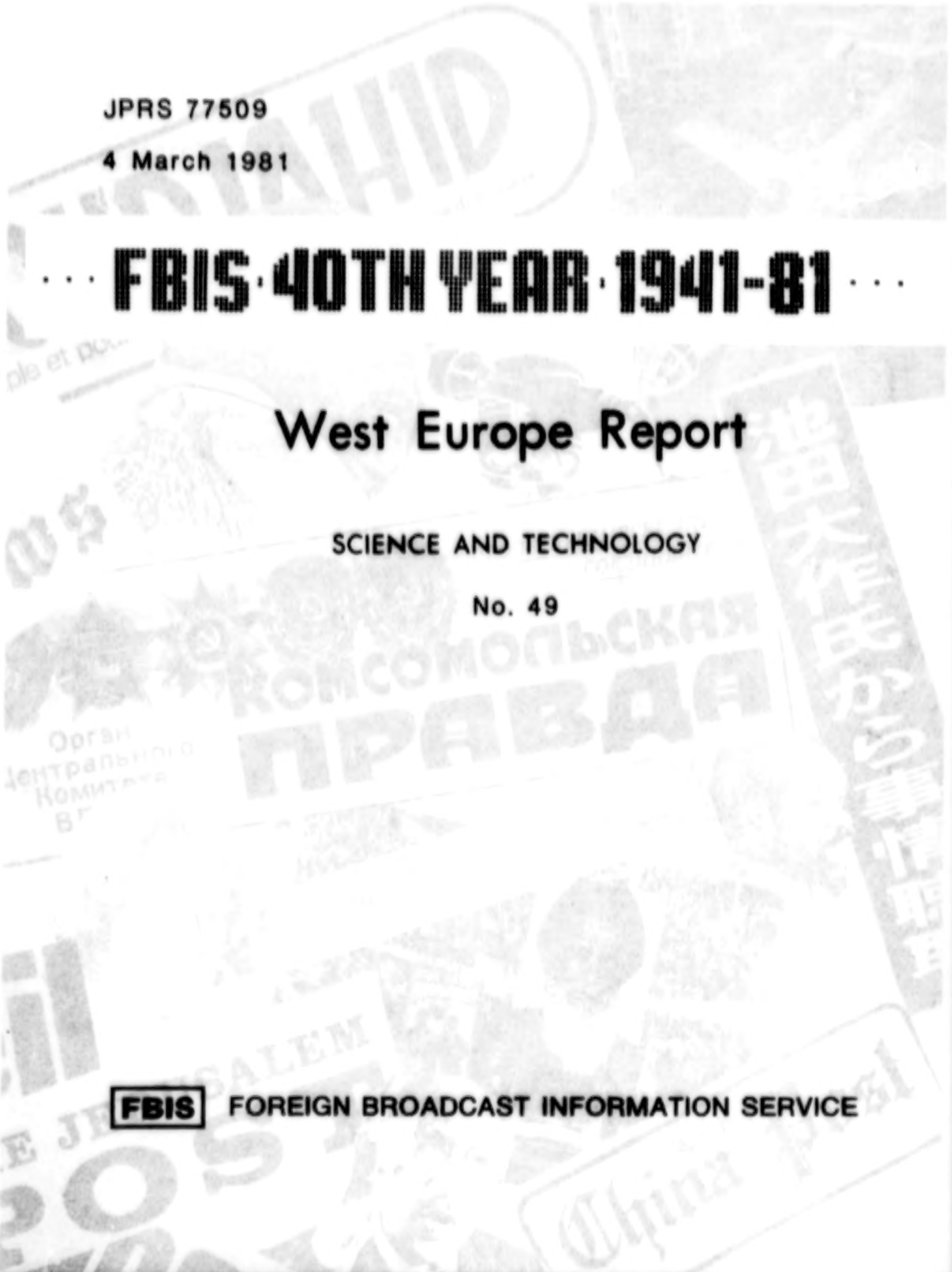

JPRS 77509

4 March 1981

· · · FBIS · 40TH YEAR · 1941-81 · · ·

West Europe Report

SCIENCE AND TECHNOLOGY

No. 49

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 77509

4 March 1981

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

No. 49

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ALTERNATE-FUELS STUDIES YIELD VARIOUS FINDINGS

Graefelfing ENERGIE in German Oct 80 pp 385-387

[Article by Georg Kacher: "Methanol for Engines--Alternative Fuels for Automobiles Still Inferior to Conventional Gasoline"]

> [Text] That engines for alternative fuels could be used is no longer solely the concern of automotive engineers; to get such automobiles rolling, the lawmakers must push harder.

Although the two carburetor fuels, premium and regular gasoline and diesel fuel, are still superior to all other fuels from the standpoints of efficiency, price and availability, factors like political independence from the oil-producing countries and the growing oil shortage are compelling intensive concentration on alternative fuels for automotive use.

As a glance at the bar chart shows, the alternative fuels--LPG, methanol, hydrogen and batteries--are clearly inferior with respect to conventional fuels in their mass-related (NJ/kg) and volume-related (NJ/cm^3) [NJ should be MJ as in bar chart] energy densities. Even the two most promising synthetic fuels--propane and butane (LPG) and methanol--achieve, with respect to the ratios weight/power and volume (or tank capacity)/power, a maximum of 60 percent of the values listed for carburetor and diesel fuels.

That the involvement with alternative energy sources pays nonetheless, especially for the automobile industry, is due on the one hand to the good compatibility of conventional and alternative fuels in modern engines and on the other to the slow but steady approach to the break-even points in light of the steady price increases for gasoline and diesel fuel.

The activities of FRG automobile firms in the sector of alternative fuels differ rather sharply in scope and investment volume. In contrast to Daimler-Benz or VW, BMW researchers in Munich, for example, limit themselves mainly to experiments with methanol and LPG. Engineer Reinhard Hofmann, director of the Preliminary Engine Development and New Engine Concepts Division, offers as reasons for this limitation: "Alternative fuels such as hydrogen and battery power are eliminated in the near and mid-term because their energy densities are too low. Conventional lead batteries are too heavy and voluminous, and hydrogen falls outside of current vehicle concepts because of its unsatisfactory tank-volume to weight ratio."

Plus 15 Percent Methanol

BMW, like all other German auto makers, is taking part in a large-scale experiment with M15--a carburetor fuel containing 15 percent methanol--supported by the Federal Ministry for Research and Technology (BMFT).

The most likely source for the required methanol is still petroleum. Within the scope of the nationwide M15 experiment--comprising more than 1,000 new vehicles, most of them privately owned--with focus in Berlin, BMW is converting the comparatively small number of 10 variants of model 732i. Nevertheless, there is something special about these BMW vehicles: "Thanks to the 'Bosch Motronic' engine electronics, which is standard equipment on the 732i, the drivers of our vehicles can fill up with M15 as well as premium gasoline. The necessary change of operating parameters (ignition, contact angle, mixture, etc.) associated with fuel variation is accomplished simply by throwing a switch on the instrument panel."

The very sparse network of methanol filling stations--there are 33 in the FRG, 11 of which are in Berlin--makes automatic adjustment of operating parameters for the type and quality of fuel encountered appear desirable. BMW is thus already working on a probe integrated in the fuel line which is coupled to a Motronic preprogrammed with fuel-specific performance charts. The probe measures the electrical conductivity of the fuel and automatically makes a smooth adjustment of the operating parameters (for example, when the tank is filled half with M15 and half with premium gasoline).

From the standpoint of the vehicle itself, the use of M15 presents no serious problems. In addition to the adjustment of ignition and mixture already mentioned, another requirements is the use of methanol-resistent materials for seals, hoses and fuel lines. With present production equipment, BMW vehicles can accommodate only a three-percent methanol admixture; a higher methanol content would cause stoppage due to swelling or decomposing hose connections. An additional property of methanol--its higher vapor pressure which presents a danger of vapor lock--can be compensated for relatively simply by increasing system pressure. The hot-start problems associated with a higher methanol content are considered solved. Daimler-Benz has conducted driving tests with mixtures up to M100.

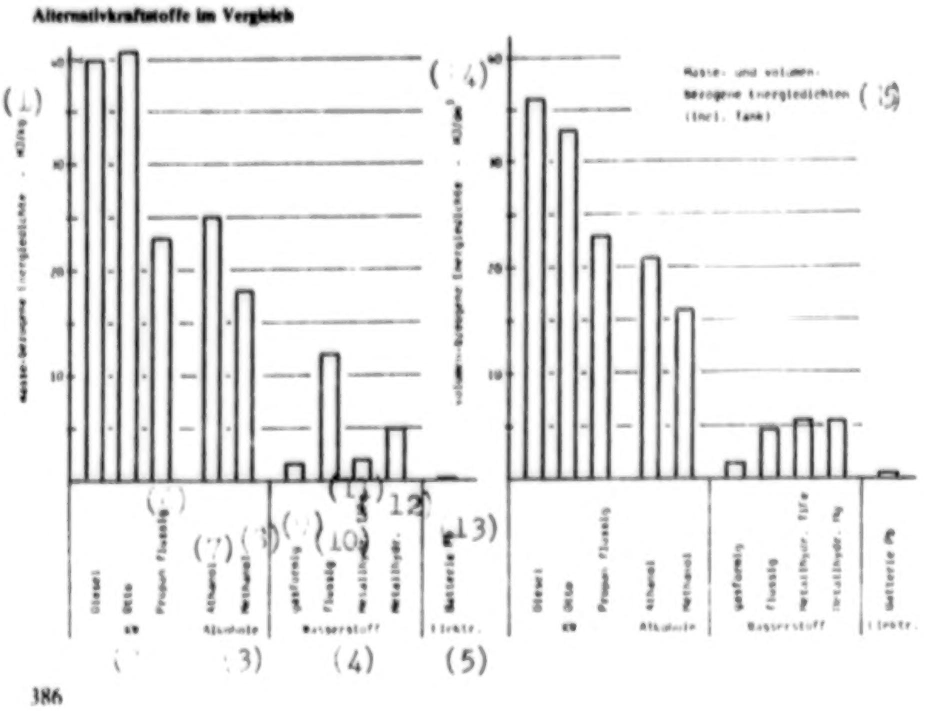
Methanol Production Inadequate

The most important technical advantage of M15--the higher octane rating which in turn permits higher compression ratios and improved thermodynamic efficiency--is weighed against a series of disadvantages which cannot be overlooked. Methanol, which can be produced from petroleum, coal or natural gas, is presently not only distinctly more expensive to produce than gasoline or diesel fuel but also is not available in the quantities necessary for mass consumption. "There exists without doubt an important supply problem," according to Reinhard Hofmann who raises this consideration: "Even if greater quantities could be imported, from the USSR for example, that in principle would only shift our dependence from the oil-exporting countries to the methanol-producing countries."

In addition, the low efficiency of methanol makes matters worse: about 80 percent of the energy is lost in conversion. For the automobile sector, as already mentioned, the volume-related energy density of methanol fuels is also a problem. To retain the present range of a vehicle powered with methanol, the tank volume would have to be doubled. In summary, a bright future cannot be projected for methanol. The BMFT recognizes this. After culmination of the large-scale experiment at the end of 1982, it will allow the chain of M15 stations created for the test to die. The automobiles will be returned to standard configuration at manufacturers' expense.

Propane Could Be Interesting

The second group of fuels considered by Hofmann to be potentially useful (excluding special cases such as battery drive for delivery vehicles in areas polluted by noise or exhaust gases) consists of the so-called liquid petroleum gases (LPG), or propane and butane (C_3H_6/C_4H_{10}) [propane is C_3H_8]. Since about 95 percent of the LPG is propane--in Holland it is 50:50--BMW is limiting its studies to the use of C_3H_6. In motor vehicles propane can be used only in liquid form. Basically, there are two methods of liquefying a gas: 1) cooling, as used in transportation from the refinery to the filling station and 2) compressing, as used in tank storage and in motor vehicles. Presently, LPG is still largely a byproduct of the refining process and comprises only about 2 to 3 percent of the refined product.



Comparison of Alternative Fuels

Key:
1. Mass-related energy density, MJ/kg
2. Power source
3. Alcohols
4. Hydrogen
5. Electrical
6. Liquid propane
7. Ethanol
8. Methanol
9. Gaseous
10. Liquid
11. Metal hydride, TiFe
12. Metal hydride, Mg
13. Lead battery
14. Volume-related energy density, MJ/dm^3
15. Mass- and volume-related energy densities include tank

Since the supply of LPG appears relatively assured compared to M15, the attractiveness of propane for the automobile industry and the driver is related mainly to the cost factors. With a present price of DM .90 per liter for LPG, amortization of the vehicle conversion cost--somewhere between DM 1,200 and DM 2,000--appears realistic only for those who drive a lot or who live along the border. With a tax deduction which is being considered by the BMFT, LPG can, however, also be of interest to users of regular gasoline in conventional engines. If the sale of greater quantities of LPG can be assured by such a tax deduction, this new market will surely wake the interest of the oil multis, which for the most part are still flaring-off the natural gas. In accordance with a Shell study, experts figure on a sixfold increase in the total European offering of LPG over the next 5 years from 3.5 million tons in 1980 to 19 million tons in 1985.

Vehicle Modification for LPG Is No Problem

A motor vehicle has to be modified to run on LPG. For this a pressurized tank is installed in the trunk, from which the propane is pumped to an expansion valve in the engine compartment. Here the heat of the engine coolant transforms the LPG from the liquid to the gaseous state, which must be accomplished before admission of the mixture to the inlet. In addition to installing the tank and tubing, other things must be done, such as partitioning the engine and trunk spaces, changing the gasoline transport system and carburetor and providing the capability for switching from carburetor fuel to LPG. According to Hofmann: "Technically, all of this is relatively straightforward; the main disadvantage for certain uses is the reduction of trunk space by the added tank. The attractiveness of LPG increases, naturally, in inverse proportion to the price of propane. For example, in Holland where butane is not taxed, 20 percent of all new BMW automobiles imported are being modified to run on LPG. BMW is thus in the process of releasing factory conversion kits."

Where then are the advantages of LPG for automobile operation? In addition to exceptionally clean and almost residue-free combustion, the use of LPG makes possible a distinct reduction in CO/HO emission. Additional pluses for LPG are a very lean mixture and very good cold start--even without cold-start lubrication--and warm running characteristics. To this are added very low contamination of engine oil by combustion residues and the associated potential for stretching the interval between oil changes. A fuel without fault or blemish? By no means. In addition to the potential safety risk of the pressurized tank, the low efficiency of LPG is also to be criticized. A motor vehicle fueled by LPG delivers under full load not only between 5 and 10 percent less power than a comparable conventional model; it also consumes about 15 percent more fuel because of the lower energy content of LPG. In other words, LPG provides less energy per liter than comparable traditional fuels. Modification of valve seats designed to use leaded gasoline also represents a technical problem of some difficulty.

The Government Must Do Its Part

In summary, it can be said that the problem of alternative fuels is not so much a technical problem, and thus one to be solved by the automobile industry, as it is a political and supply problem. The DM 2.5 million which BMW has invested in the BMFT project, and the far greater sums consumed by the parallel developments involving LPG and ethanol (gasohol in the USA with up to 30-percent ethanol content), will be good investments only if the government and the petroleum industry do their part.

Tax deductions and the readiness of the oil companies to force the production of synthetic fuels and to assure their supply (even if only indirectly) are prerequisites for the necessary unburdening of our hard-pressed oil economy. The readiness of industry to offer appropriately equipped motor vehicles and the willingness of drivers to accept higher purchasing prices to achieve long-range economies appear to exist. Perhaps by the mid 1980's, instead of the present three gas station pumps, four or even five would be nothing out of the ordinary.

9160
CSO: 3102

CHEMICALS

TALKS ON COOPERATIVE RESEARCH ON LIQUID FUELS FROM BIOMASS

Duesseldorf EUROPA CHEMIE in German 1 Dec 80 p 611

[Article: "Gist Brocades and Shell Are Considering Joint Research in Biotechnology"]

[Text] Gist Brocades NV, Delft, and Shell International Research Mij BV are presently discussing possible joint research in biotechnology. These talks include investigation of an integrated process for the production of liquid fuels from biomass and research of the potential for use of cellulose as a basic material for the chemical industry. At Gist Brocades, biotechnology has been the basis of its fermentation processes for many years, whereas Shell still has little experience in this field. Gist Brocades expended 54 million gulden for research and development in 1979. About 600 people are employed in this area, about half of whom are in biotechnology.

In the early stages of the joint project, which will probably be solidified at the beginning of 1981, only know-how and a few researchers will be included. Involved are 30 Gist Brocades employees in Delft and 10 Shell employees in Sittingbourne, England, who will take part in an information exchange. If the results lead to investments, these will probably come from Shell, since Gist Brocades does not have the necessary capital for large investment programs.

Gist Brocades is presently attempting to divest itself of four of its Brocatrade subsidiaries which produce consumer products: cosmetics, nonprescription drugs, hygiene products and fruit wines. These companies have about 200 employees and have produced only marginal results. Also, they are not well integrated with the other activities of the parent company. In the first half of 1980, Gist Brocades recorded sales of 640.6 million gulden (+7.7 percent) and a net profit of 11.1 million gulden (+4.7 percent).

9160
CSO: 3102

ENERGY

EEC HELPS DEVELOP ALFA ROMEO MICROPROCESSOR ENGINE

Rome SCIENZA & VITA NUOVA in Italian Jan 81 p 102

[Text] A modular engine with intermittent electronic injection will save about 20 percent of the gas consumed in a traditional engine, if our car or a taxi is used in the city.

The prototype belongs to Alfa Romeo and it was developed by CNR's "Energetica' Finalized Project, (traction subproject). It involves a microprocessor, whose software was researched and developed by Alfa Romeo, which, through sensors, instantly picks up signals of charge and power needed and then injects, as a factor within these parameters, enough fuel in either two or four cylinders, thus saving fuel.

The experiment, which began using an Alfetta 2000 as a prototype, will enter a second phase beginning in February. This will involve a period of 6 months, for a total of about 150,000 kilometers traveled by 10 Milan taxicabs, from which all the data on fuel savings will be gathered. The experiment, which will cost 250 million lire, is 40 percent financed by the European Economic Community.

This is not the first time that the EEC is making use of the work of Italian companies when it comes to energy conservation. Mention was made in these pages (SCIENZA & VITA NUOVA No 1, January 1980) of a Bluflam heat generator manufactured by the Officine Termotecniche Breda of Bari. Of over 300 projects submitted to the EEC incentive programs for energy conservation framework beginning in September 1979, involving a total of 31 billion lire, over 60 were selected. Among these, in addition to Alfa Romeo's modular engine, there is Breda Termomeccanica's (Ansaldo) of Milan project for a heater using fluidized bed combustion technology (costing 6 billion lire, 30 percent financed by EEC) as well as Italtractor of Modena's project dealing with cooling of metals processes (costing over 1 billion lire, of which 40 percent was financed by the EEC).

9209
CSO: 3102

ENERGY

BRIEFS

WAVE-POWERED SHIP--Successful tests were performed this past summer at Trondheim (Norway) in the model basin on ships 50 meters long. The process was discovered by a Norwegian electrical engineer, Einar Jakobsen, and could be used in some fishing fleet sectors. It consists of using a hinged plate mounted horizontally on an axle beneath the ship and moving up and down with the movement of the ship in the waves. Tests will continue with a view to marketing the system. [Text] [Paris SEMAINE DE L'ENERGIE in French 22 Dec 80 p 12] 11915

CSO: 3102

SCIENCE POLICY

CURRENT, FUTURE FOCAL POINTS OF RESEARCH EXAMINED

Rome SCIENZA & VITA NUOVA in Italian Dec 80 pp 83-92

[Article by Paola De Paoli]

[Excerpts] Under the particular heading "per-capita research expenditures," Italy, among the industrialized countries, lags behind. In addition, it bears the burden of a fragmentary structure that makes optimal exploitation of resources difficult. All this at a time when, more or less everywhere, there are new impulses in technological innovation in order to recover lost ground and make up for the time lags caused by the energy and economic crisis. It is worth noting, by way of example, the "innovation bonuses" created in France as of July 1979 by ANVAR [National Agency for Exploiting Research], with automatic reimbursement to firms of 25 percent of expenditures incurred in research work, with a mechanism that favors those concerns for which, for various reasons, self-financing is otherwise impossible.

For the figures, we refer to the budget data of ISTAT [Central Statistics Institute], the official source of statistics for the government--data which, for the heading "research," end at 1978. For the year in progress, the expenditure forecast is taken from the 1980 report of the National Research Council (CNR), as shown in detail in the table below.

A quick examination of these figures is not encouraging. The total expenditure on research and development expected for Italy in 1980 totals 3.182 billion lire; full-time staff employment is 75,339 persons, including 32,858 researchers--that is, persons involved in the conception and organization of research activities.

The budget shows an increase of 32.8 percent over last year, but despite this, as compared with the principal countries of the OECD (Organization for Economic Cooperation and Development), the Italian commitment to research and development, in absolute terms, is greater only than Belgium's, but less than what is spent even in countries of modest size such as Switzerland. In relative terms--expenditure as a percentage of Gross National Product--Italy, with 0.9 percent, spends less than almost any other country. Comparison with the countries of the EEC leads, practically speaking, to analogous conclusions.

Even the 32.6-percent [as published] increase is notable only in appearance, since in effective terms--that is, at uniform 1970 prices--it sags strikingly. Figures swollen by inflation are of little usefulness--and all the more so in that at the beginning of the last decade, other countries tackled research starting from an expenditure base between three (France) and five (FRG) times higher than that of Italy.

1) CONSIGLIO NAZIONALE DELLE RICERCHE: SPESE PER RICERCA NEL 1980 (PREVISIONE)

2) VOCE FUNZIONALE	3) Organi di ricerca	4) Contratti di ricerca	5) Borse	6) Contributi art. 20/2-7	7) Contributi Art. 2 n. 4	8) Altre spese di ricerca	9) TOTALI
	Importo	Importo	Importo	Importo	Importo	Importo	Importo
10) Scienze matematiche	1.568.000.000	310.000.000	1.500.000.000	618.000.000	—	—	3.996.000.000
11) Scienze fisiche	6.280.000.000	2.913.000.000	450.000.000	150.000.000	303.000.000	—	10.096.000.000
12) Scienze chimiche	7.456.000.000	557.000.000	380.000.000	240.000.000	2.422.000.000	—	11.055.000.000
13) Scienze biologiche e mediche	6.271.000.000	—	604.000.000	400.000.000	5.025.000.000	—	12.300.000.000
14) Scienze geologiche e minerarie	2.840.000.000	204.000.000	110.000.000	100.000.000	1.253.000.000	—	4.507.000.000
15) Scienze agrarie	3.405.000.000	939.000.000	400.000.000	100.000.000	1.827.000.000	—	6.671.000.000
16) Scienze ingegneria e architettura	2.613.000.000	228.000.000	400.000.000	350.000.000	4.665.000.000	—	8.256.000.000
17) Scienze storiche, filosofiche e filologiche	749.550.000	280.000.000	587.000.000	1.489.450.000	1.650.000.000	—	4.756.000.000
18) Scienze giuridiche e politiche	630.000.000	700.000.000	500.000.000	305.000.000	1.000.000.000	—	3.135.000.000
19) Scienze economiche, sociologiche e statistiche	190.600.000	867.400.000	400.000.000	615.000.000	1.069.000.000	—	3.142.000.000
20) Ricerche tecnologiche	5.184.000.000	1.150.000.000	315.000.000	138.000.000	1.150.000.000	—	7.937.000.000
21) TOTALI PARZIALI	37.187.150.000	8.148.400.000	5.726.000.000	4.505.450.000	20.364.000.000	—	75.931.000.000
22) Progetti finalizzati	9.047.600.000	55.756.620.000	874.620.000	—	—	a) 14.321.180.000	80.000.000.000
23) Programmi internazionali	200.000.000	—	—	—	—	3.750.000.000	3.950.000.000
24) Attività di ricerca connessa con le entrate	1.800.000.000	—	—	—	—	—	1.800.000.000
25) Spese di organizzazione delle iniziative scientifiche	—	—	—	—	—	18.840.000.000	18.840.000.000
26) Spese per programmi spaziali	3.640.000.000	46.100.000.000	200.000.000	30.000.000	2.100.000.000	600.000.000	52.670.000.000
27) Attività culturali e scientifiche di carattere generale	320.000.000	50.000.000	—	100.000.000	80.000.000	—	550.000.000
28) Consorzi per organismi di ricerca	—	1.900.000.000	—	—	—	600.000.000	2.500.000.000
29) Nuovi Organi di ricerca nel Mezzogiorno	1.874.550.000	—	—	—	—	—	1.874.550.000
30) Servizi elaborazione dati per le attività di ricerca	—	—	—	—	—	6.000.000.000	6.000.000.000
31) Convenzioni	—	—	—	—	—	5.980.000.000	5.980.000.000
32) Spese immobiliari per le attività di ricerca	—	—	—	—	—	32.370.000.000	32.370.000.000
3) Altre spese di ricerca	4.000.000.000	—	950.000.000	—	—	610.000.000	5.560.000.000
33) Oneri per il personale tecnico professionale	—	—	—	—	—	b) 86.850.000.000	86.850.000.000
9) TOTALI	58.169.300.000	111.958.020.000	7.750.620.000	4.635.450.000	22.544.000.000	168.331.180.000	373.265.550.000

34) a) Compreso l'accantonamento al cap. 110060 per L. 6.839.180.000, parte del cap. 110050 per L. 327.300.000, parte dei capitoli 104240 e 212080 per L. 2.060.000.000 e parte del cap. 102060 per L. 102.100.000.

35) b) Compreso parte dell'accantonamento al cap. 110050 per L. 3 miliardi.

[Key on following page]

[Key for table on preceding page]

1. **National Research Council: Research Expenditures in 1980 (Forecast)**
2. **Functional Heading**
3. **Research organs**
4. **Research contracts**
5. **Grants**
6. **Art. 20/2-7 contributions**
7. **Art. 2 No. 4 contributions**
8. **Other research expenditures**
9. **Totals**
10. **Mathematical sciences**
11. **Physical sciences**
12. **Chemical sciences**
13. **Biological and medical sciences**
14. **Geological and mineral sciences**
15. **Agricultural sciences**
16. **Engineering sciences and architecture**
17. **Historical, philosophical and philological sciences**
18. **Juridical and political sciences**
19. **Economic, sociological and statistical sciences**
20. **Technological research**
21. **Subtotals**
22. **Purpose-directed projects**
23. **International programs**
24. **Research activites connected with income**
25. **Expenditures for organizing scientific initiatives**
26. **Expenditures for space programs**
27. **Cultural and scientific activities of a general character**
28. **Consortia for research organisms**
29. **New research organs in Mezzogiorno**
30. **Data-processing services for research organisms**
31. **Conventions**
32. **Real-estate expenditures for research activities**
33. **Costs for professional technical personnel**
34. **Including the Chapter-110060 allocation of 6,839,180,000 lire; part of the Chapter-110050 allocation, 327,300,000 lire; part of the Chapters 104240 and 212060 allocations, 2,050,000,000 lire; and part of the Chapter-102060 allocation, 102,100,000 lire**
35. **Including part of the Chapter-110050 allocation, 3 billion lire**

In the data related to Gross National Product, Italy registers a percentage of 0.91 percent (2.1 percent in the FRG; 2.3 percent in England; 1.8 percent in France). The appropriations planned this year raise the percentage to 0.97; but the gap remains and threatens to grow worse--because, among other things, this last datum is a forecast, and only the balance-sheet will be able to tell us whether the appropriations have been used by our research structures over which the threat of residual deficits hangs: that is, funds whose use has been impeded by bureaucratic obstacles.

A look at the general breakdown of expenditure tells us that the top heading, "general promotion of knowledge," has suffered a percentage drop vis-a-vis last year (from 26.2 percent to 25.8 percent), confirming the fact that Italy is no exception to the general tendency to penalize fundamental research in favor of applied research. By comparison with the previous year, the relative percentages for the following headings have also been lowered: "protection and promotion of human health," which has dropped to seventh place; "ordering of the human environment," down to sixth; and "exploration and utilization of space," to fifth. The headings of immediate economic impact emerge in important positions: "production, distribution and rational utilization of energy," in second place with 22.5 percent of expenditure, and "productivity and industrial technologies," in third place at 19.6 percent.

Who Is Doing Research

We said at the beginning that Italian research presents a broad articulation which, while it can stimulate technological pluralism and alternative solutions, risks impeding activities and exploitation of expenditure precisely because of the meandering of the competencies acquired. Seventeen ministries, a similar number of institutions, 22 purpose-directed projects of the CNR, the IMI [Italian Credit Institute] Fund for applied research: these are quite a few, all the more so in that along with them goes only one minister without portfolio whose function is supposed to be coordination on the basis of a national plan. In reality, there is no plan, and for years, things have been done by way of deliberations by the CIPE (Interministerial Committee for Economic Planning), which recognizes the priorities on the basis of the indications that emerge from the report of the CNR and after listening to the opinions of the ministers of public instruction and scientific research: the latter, then, continues to act through "delegates" of the prime minister (on the CNR, on space activities, etc)--a situation that certainly does not facilitate the powers of coordination.

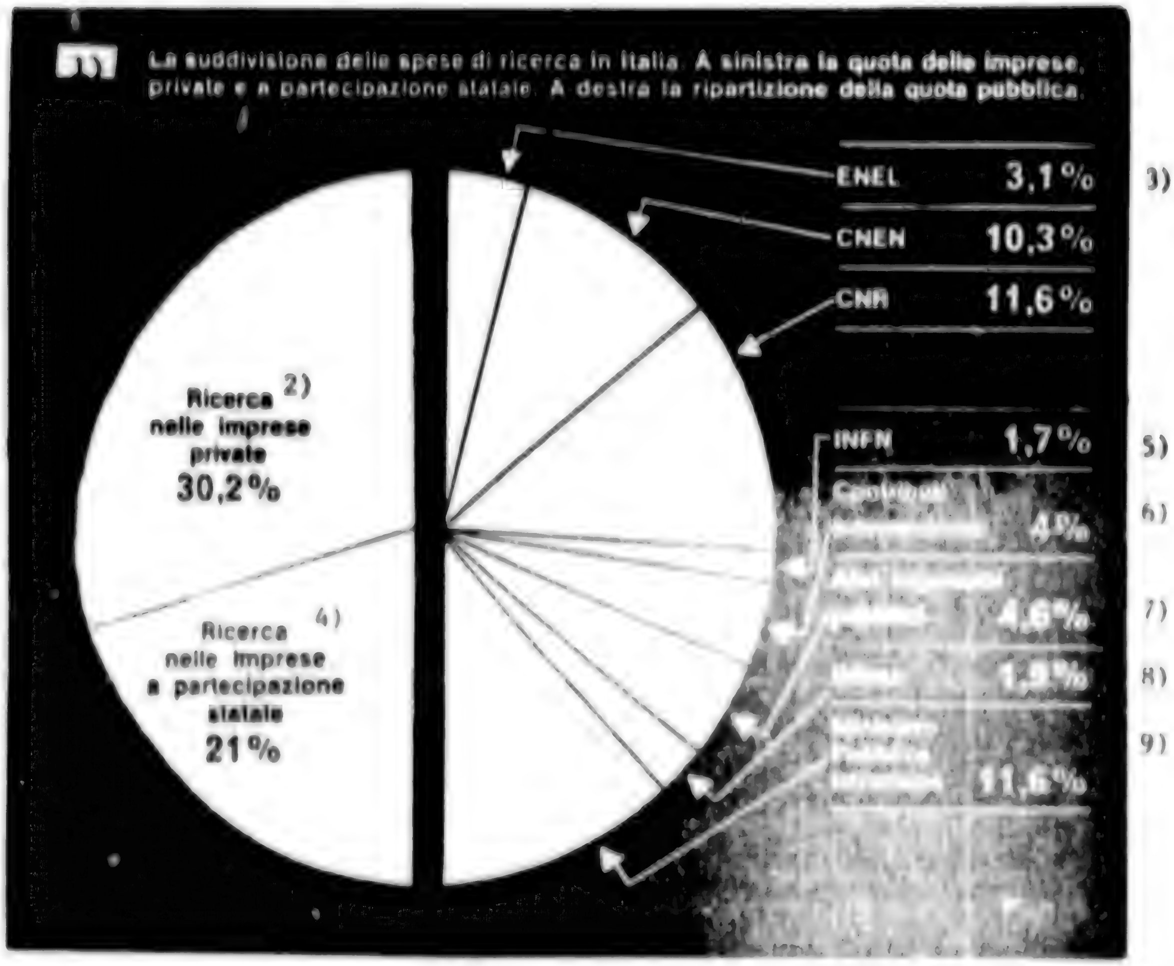
The 17 ministries concerned (the data relating to them, as well as the other data on the "promoters" of public research, are taken from the CNR's 1980 report, submitted in the autumn) are: Public Instruction, Defense, Agriculture & Forests, Health & Sanitation, Industry & Commerce, Transport & Civil Aviation, Merchant Marine, Public Works, Post & Telecommunications, Interior, Mercy & Justice, Finance, Labor & Social Welfare, Cultural Assets & Environment, Foreign Affairs, State Participations, Development of the South.

Industrial Technologies

Combining in an appropriation of more than 668 billion lire--which represents 21 percent of total expenditure, with an increase of 45.3 percent over the year befoore--are the enterprises of the IRI [Industrial Reconstruction Institute] Group (with 426.3 billion, equal to 63.7 percent of the total), of the ENI [National Hydrocarbons Agency, with 157.2 billion, 23.5 percent of the total), and of the EFIM [Manufacturing Industry Holding and Financial Company] (with 85.1 billion, or 12.72 percent of the total).

About half of the appropriations is committed to the productivity and industrial technologies sector. This comprises: the products of the steel and metallurgical industry, where innovation is proving far more necessary, from materials to overhaul of the processes; the products of the chemical and petrochemical industry, with a spending increase by the ENI group for secondary chemistry (52 percent), but without neglecting primary chemistry (48 percent), commitment to the continuity of which lies precisely in innovation; the products of the mechanical and electromechanical industry, with Ansaldo's turbines and turboalternators, in order to obtain maximum independence from licenses; products of the electronics industry, data-processing systems and automation of productive processes, with the commitment of the STET [Telephone Finance Corporation] in the area of electronic components and computers. Second place, which is held by the defense objective (with 146.2 billion invested, mainly in the aeronautical field), is followed, as regards magnitude of financing (94.4 billion), by the area of "ordering of the human environment," with projects in ground telecommunications (Proteo) and digital systems in cable and optical fibers (Sintra), these last-named projects being carried out jointly by ITALTEL--formerly SIT [expansion unknown]-Siemens--the CSELT [Telecommunications Research and Study Center], and SIP [Italian Telephone Company].

Of great qualitative importance, even though it is in fourth place as regards financing (55 billion), is the research on production and rational distribution of energy



[Key]

1. Breakdown of research expenditures in Italy. At left, the proportion for the enterprises, both private and state-participation. At right, the breakdown for the public side.
2. Research in private enterprises
3. ENEL [National Electric Power Agency]
4. Rese[illegible] [illegible]ipation and [illegible]
5. [illegible] [illegible]ar [illegible]
6. INF[illegible] [illegible]ons
7. [illegible]
8. [illegible]
9. [illegible] [illegible]tion

(fossils, solid, liquid, gaseous fuels); nuclear [illegible] [illegible] Nuclear Machinery] and NIRA [Italian Nuclear (Company) [illegible] solar energy (including the Community project for the 1-MWe [illegible] being carried out, on the Italian side, by ENEL and by Ansal[illegible] [illegible] geothermal energy, energy conservation and saving, with the [illegible]

Finally, there follow exploration and utilization of [illegible] with the telecommunications-via-satellite activities of the STET [illegible] group, especially with the presence of Aeritalia in the Europ[illegible] [illegible]exploration and utilization of Earth (24.4 billion), aimed at [illegible] technologies for hydrocarbons, uraniferous minerals, geothermal [illegible] [illegible]rous minerals; while in next-to-last place come agricultural p[illegible] [illegible]nologies.

The Public Research Agencies

The other ministries figure in the expenditure-breakdown table along with other research agencies, for a total figure of 76.7 billion, equal to 2.4 percent of total expenditure. Among these, we mention the eight Experimental Stations of the Ministry of Industry: for fuels (methanol for automotive vehicles and heating; exploitation of heavy crude oils; polycyclic hydrocarbons); for the hides and tanning-materials industry; for cellulose, paper, vegetable and artificial textile fibers; for the oils and fats industries; for the citrus essences and derivative industry; for the preserved-foods industry, in which the modern deep-freezing and dehydration techniques are especially important; glass and silk.

And we come to the public research agencies. For 1980, the National Research Council (CNR) has a foecast allocation of 368.2 billion, comprising--as the table shows--the 80 billion for purpose-directed projects.

This financing is equivalent to 11.6 percent of total expenditure, and is equal to that allotted to the Ministry of Public Instruction; but while the increase over 1979 for the latter is 49.5 percent, it is limited to 9.8 percent for the CNR.

As for the 11 Advisory Committees (whose 4-year mandate expires this year and which will therefore have to be renewed by the election procedure, within a reasonable time, one hopes), we find "Medical and biological sciences" in first place with 12.3 billion. Nevertheless, this Committee's report is extremely critical, even if considerable progress is cited. Beyond the considerations on the magnitude of the financing ("research contracts and contributions," for example, are down about 5 percent from 1979), this Committee's pessimistic forecasts regarding rational exploitation of the expenditure concern precisely the state of purpose-directed biomedical research in relation to the regional-level activities planned for by the PSN (National Health Plan).

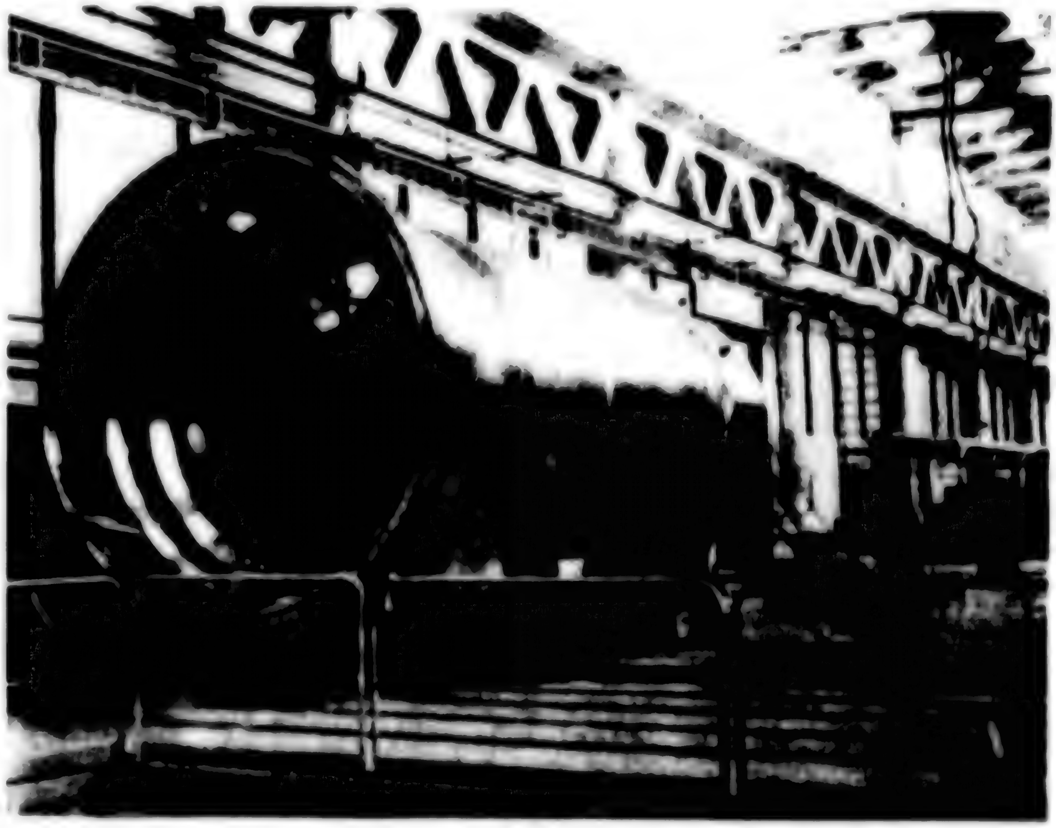
It is regretted, for example, that as of September 1980, the Ministry of Health & Sanitation had not yet named the coordinating committee for this purpose-directed research. The regions, therefore, lacking precise orientation, certainly do not seem to be in a position to prearrange the programming and management mechanisms for such research activites: to date, no appropriation has been prearranged out of the 38 billion assigned to the regions for 1980.

Another example--the report continues--of the meager interest of the regions in the problems of research concerns the fund (Law 285) for professional training: 21 billion in 3 years, intended for 980 graduates and diploma-holders. No request has been sumitted for using such personnel for the purposes envisioned by the reform.

The CNR's 22 Purpose-Directed Projects

--Improvement of plant production fo! food and industrial purposes through genetic engineering
--New sources of protein and new nutritional formulations
--Agricultural chemicals and phytoregulators
--Containers
--Protection of genetic resources of animal populations
--Increasing the availability of foods of animal origin
--Agricultural mechanization

--Preventive medicine
--Viruses
--Biology of reproduction
--Biomedical technologies
--Soil conservation
--Oceanography and sea bottoms
--Geodynamics
--Promotion of the quality of the environment
--Aids to navigation and air-traffic control
--Consolidation, development and conversion of aquiculture
--Computer technology
--Superconductivity
--Power lasers
--Tumors
--Energetics



The steel and metallurgical industry is among the sectors in which innovation is most necessary. In the photo, a component for the PEC [expansion unknown] nuclear reactor of the CNEN [National Nuclear Energy Commission], by Breda Termomeccanica.

Five Urgent Actions for Revival

With the investments, the objectives, and the responsible subjects specified, one cannot, then, fail to complete the picture without [as published] talking about the bill which the then minister of research, Balzamo, had presented the past July on "urgent provisions" for scientific research in the 4-year period 1980-83. Born as "orientations" for action in support of research, the bill was discussed in the Chamber, in its eight terse articles, at the beginning of September; it is on its complex legislative journey, and there is no foretelling its duration or final outcome. Nevertheless, it is worth the trouble to know its strategy, which is centered on the productive system and on the social services.

As regards the productive system, everything hinges on technological innovation: from that of the labor-saving type (recovery of productivity) so as to eliminate big pockets of inefficiency in the production structures and to restore international competitiveness to the sectors of traditional type, to those that make qualitative improvement of products possible, reduction of energy use (especially of nonrenewable sources) as well as use of materials and of fixed capital. In the long run, the end purposes tend toward the creation of new industrial structures and of new productive sectors based on radical innovations in the technologies employed.

As regards the social services, the necessity is recognized for a general increase in their quality and their productivity through strengthening and broadening of the technical-scientific services for monitoring and management of the environment and of the territory: that is, laboratories, networks for obtaining and transmitting data, assistance and experimentation centers (such as have already been in operation for years in EEC countries but are lacking or functioning poorly in Italy) in sectors (such as, for example, soil conservation, agriculture, etc) that are strictly connected with physical conservation of the territory or with productive activities. The urgently necessary provisions are articulated in five well-specified points: (1) public intervention in support of technological innovation in order to improve the international competitiveness of existing production; (2) national strategic programs coordinated with the industrial and social policy programs for development of new productive activities; (3) strengthening of the scientific and technical services for management of physical territory; (4) definition of a coordinated program of action in the Mezzogiorno; (5) legislative provisions to reorganize the institutional framework of research in Italy.

1. Competitiveness

Three actions are identified, with their related appropriate operational instruments. The first consists in increasing the financial resources available to enterprises for creating new technologically innovative processes with corresponding cost reduction, using the instrument of IMI-Fund refinancing for applied research through the sinking-fund support formulas (high-risk research) or special-credit support. The idea is not a new one (the IMI Fund was created in the 1970's, and it is the only incentive existing in our country); what is new is the proposal aimed at mitigating the present dissatisfactions of the enterprises over the delays in conclusion of contracts and the deficiencies in the management mechanisms.

Other instruments are also indicated for the research contracts on the operational level, in activation of financial structures for channeling private savings into financing of productive initiatives based on technological innovation, in reduction of the tax pressure (the approach favored also by the American enterprises) on innovating firms through, among other things, faster amortization of fixed-capital investments for research, and in possible selective fiscalization of social charges in function of the added value of the products and the enterprises' research expenditures.

The second action consists in providing technological services to the productive and social-services system by creating a technological-transfer system, articulated on the national scale (that is, an agency responsible for designing, creating and managing the information system, with access to technological-data banks and to technical-scientific documentation services) and on a decentralized territorial scale (that is, with operational regional agencies that are purpose-directed toward technical assistance to medium and small enterprises).

The third action is the creation of a "market" for innovation connected with the possibility of commercial success. This would mean creating an adequate unitary policy of public demand in specific sectors (electronics, health, transport, etc) in such a way that the enterprises that intend to introduce innovative processes can foresee a concrete outlet into a real market to justify the research and development investments. The setting-up of a public economic organism responsible for operational management of the various instruments in support of innovation (the French ANVAR and the English NRDC [National Research Development Corporation] are comforting realities) is therefore being planned for such action.

2. National Strategic Programs

As regards their scientific objectives and the activities connected with the country's economic-social fabric, the national strategic programs extend over a broader time span, being based mainly on the research contract. They are identified on the basis of the requirements projected by the world of production, by the public administration, and by the research organs themselves, as well as on analysis of the long-term programs of the industrialized countries, and it is considered that they can have a positive effect on the country's operational and social structures, especially in these sectors: microelectronics, telematics, space and marine technologies, renewable energy sources, food and materials technologies, biotechnologies.

3. Environmental Scientific-Technical Services

The first exigency consists in unification of the various legislative provisions relating to the environment: therefore, identification, restructuring and upgrading of the existing services (just consider the Geological Service of the Ministry of Industry, the Seismic Service, the Marigraphic Service and the Hydrographic Service of the Ministry of Public Works, the National Institute of Geophysics of the Ministry of Public Instruction, the Meteorological Service of the Air Force, etc), and the creation of new structures for the deficient sectors. Among these, for example, environmental cartography--that is, a whole series of atlases and maps on the soil, fauna, etc--appears to merit priority.

Five sectors are specified: geological, articulated in a central division and regional divisions; seismic, with a data-gathering network and a data-processing and distribution section; hydrometeorological, with sections specializing in assistance to agriculture; cartographic; and pedagogic (for vegetation and fauna).

4. Action in the Mezzogiorno

It is important not to underestimate the role of technologies in reviving the southern economy, so as not to aggravate imbalances experienced up to this time. How? By a policy to promote research and technological innovation that makes good use, in a coordinated manner, of the legislative instruments already in existence, such as Law 183 and the Special Research Project in the Mezzogiorno, developing "technological poles" in connection with specific sector plans approved by the CIPI (Interministerial Committee for Industrial Policy Coordination)--in practice, the "research consortia" among agencies, universities, public and private enterprises.

5. The Bill's Articles

There are eight of them, with a series of indications; we cite the main ones.

The Interministerial Committee for Coordination of Research (established in March 1980 and composed of 18 ministers) is chaired by the minister of research by delegation of the prime minister. Its tasks are to indicate the orientations for preparation of the general report on the state of research; to express opinions on the directions of scientific policy; and to formulate the criteria for coordination of the programs of agencies and of the public administration.

Direction and supervision of the CNR are exercised by the minister of research, by delegation of the prime minister. The annual report prepared by the CNR on the state of research is presented to Parliament by the minister of research.

The personnel for the offices of the minister of research are obtained thrugh assignment from other state administrations. Experts are provided also, but the maximum number, including the experts, may not exceed 200.

Within 6 months from the time the law goes into force, the government must issue legislative provisions for the reorganization of the CNR.

11267
CSO: 3102

SCIENCE POLICY

ANVAR REPORT OVER 548 MILLION FRANCS IN GOVERNMENT FUNDS DISTRIBUTED

Paris AFP SCIENCES in French 15 Jan 81 p 7

[Text] Christian Marbach, general director of ANVAR, stated on 13 January that more than 1,000 independent businesses, laboratories and inventors received support in 1980 from the National Agency for Valorization of Research (ANVAR), representing a distribution of Fr 548 million in aid for innovation.

In presenting ANVAR's statement of operations 1980, Mr Marbach explained that the amount of aid distributed was more than the Fr 430 million initially planned, since a large budget appropriations bill in December made it possible to substantially increase government aid for innovation.

The aid distributed by ANVAR, which may cover up to 50 percent of the projects submitted, is granted a priori on the basis of innovation records. Thus the agency's 1,000th grant was distributed in November to a medium-size construction company located near Angers, Societe Duchemin, which will receive Fr 500,000, one-fourth of its investment, for an innovation project (a system permitting great architectural versatility).

Two-thirds of the companies receiving innovation aid had never before applied for public joint financing of their research programs or technical development, according to ANVAR, and 74 percent of the aid awarded in 1980 was granted by regional delegations.

But ANVAR does not distribute aid alone; it also grants innovation subsidies. Automatically distributed, these subsidies have been granted a posteriori since 1 January 1980 to all businesses applying for them. Thus in 1980, ANVAR received more than 1,600 subsidy applications for a total of Fr 12.5 million.

Mr Marbach stated that ANVAR will be able to distribute Fr 570 million in aid for innovation and Fr 30 million in subsidies during 1981.

In this connection, an analysis of innovation by industrial sectors in France will be published in 3 months and between now and the end of the year the agency will be in a position to assess the various capabilities of these sectors or branches of industry to innovate.

11915
CSO: 3102

SCIENCE POLICY

RESEARCH MINISTRY SCRATCHES TWO LARGE PROJECTS

Duesseldorf HANDELSBLATT in German 16/17 Jan 81 p 5

[Text] Bonn, 15 January--Two major research projects will definitely no longer be financed with state funds. At the same time the government wants to encourage greater participation by industry in existing research projects. These are some of the most important results of the closed session of the Ministry for Research and Technology, which took place over 2 days in Bad Muenstereifel near Bonn. The projects that can no longer count on state support are:

--the coal liquefaction plant in the United States, in which Bonn intended to participate to the amount of DM 680 million;

--the railroad experimental facility in Rheine-Freren, where high-speed tests were to be carried out. Minister of Research Andreas von Buelow proposed subsidizing the stretch of test track from transportation budget funds to Minister for Transport Volker Hauff, but this would probably cause difficulties. The Rheine-Freren project involves a sum on the order of DM 180 million.

The closed consultations in Bad Muenstereifel were under the handicap of the reduced budget of the Ministry for Research, which, at DM 6.1 billion, had fallen DM 700 million short of the initial estimate. So Minister for Research von Buelow's motto of preserving a "necessary minimum of freedom of disposition" for the ministry was given the highest priority, in spite of the budget squeeze.

In the minister's estimation, participating in both the major projects mentioned would have limited his budgetary mobility too severely. So the final decision was reached not to participate in the coal liquefaction plant in the United States. The cabinet had commissioned the ministry to examine this suggestion, which had already been proposed at the consultations on economizing.

It was said that the decision was unavoidable because no concrete offers to participate in the project in the United States had been received from German industry, although several discussions about it had been conducted at various levels. Finally, the ministry emphasizes that state participation in the project through Bonn could not be forthcoming, in order not to endanger equivalent German pilot plants.

Efforts to obtain greater participation from industry in research projects was also a general point of discussion at the Research Ministry's closed sessions. In the field of nuclear research (principally involving the quick breeder and high-temperature reactor) the government expects greater involvement by industry. Minister for Research von Buelow plans to hold talks on this subject in January with the electricity supply companies.

9581
CSO: 3102

SCIENCE POLICY

PROMOTION, COORDINATION OF RESEARCH EFFORTS PROPOSED

Rome SCIENZA & VITA NUOVA in Italian Jan 81 p 102

[Text] According to Minister for Scientific Research Pier Luigi Romita, the division between basic and applied research is artificial. The problem is more one of helping and improving the exchange between the different research bases and of encouraging collaboration between public and private sectors, especially with regard to the end phase. This is the reason why the subject of research promotion is one and the same as that of coordination. This is a statement on scientific policy that Romita is well qualified to make, thanks to his experiences as a university professor, as well as his position in the research department in 1972, a position he holds at the present time.

Coordination implies the preparation of programs and the setting up of a support network within an organic system of technical-scientific assistance. "Every technological change" stated Romita "will find, in the new decade, its legitimization and its indispensable political support in the community's aspirations and decisions. It is therefore necessary rapidly to define a clear political organizational-institutional framework for research, placing at the minister's disposal effective powers for coordination and guidance. A better organized research program will also make more efficient those activities aimed at innovation."

Regarding this subject matter, Romita, speaking at a CIPE (Interministerial Committee for Economic Planning) meeting, made reference to three specific objectives, to be coupled with the same number of actions: 1. Improve existing competitiveness in production, be it with the IMI Fund, refinancing applied research with 2,000 billion lire for the period 1980-1983, or be it through fiscal aid; 2. Aid to small and medium size companies with a program of innovative technology transfer, and a total commitment of 70 billion lire in the 4-year period from 1980 to 1983; 3. Encourage the development of new productive activities, launching strategic scientific programs in sectors linked to industrial development (telemathics, energy sources, new and old material technology and marine technology).

9209
CSO: 3102

FOKKER F-29 PROJECT DEFINITION EXPECTED BY END OF 1981

Rome AVIAZIONE in Italian Jan 81 pp 759-761

[Article by Vito Tullio: "Successor of the Fokker-28 Defined"]

[Text] Fokker has stated that it can define the F-29 project this year. The F-29 is the new twin jet with advanced technology with which the Dutch company is hoping to duplicate the success of the F-28. The faith placed by Fokker in the new program was shown last year at Farnborough, when it was stated that $75 million have been assured up to the middle of 1981. So far, 6,000 hours of wind tunnel time have been accumulated.

After the project underwent a particularly "intense" phase last year, Fokker is said to have made the marketing men more aggressive by being able to offer now greater guarantees to potential customers concering the techical and economic performance of the F-29. With an all-economy capacity of 138 seats (3+3 on a 34-inch aisle), it aims at offering on the market the replacement of the F-28 itself, especially for those operators whose traffic flows are tending to increase and also a potential capable of other fringe benefits than the DC 9-30 and Boeing 737 for those "minor" airlines that, on the other hand, do not yet believe it advisable to go over to larger machines. And with the approaches to the market, approaches to suppliers and possible industrial partners are gaining ground. The first flight of the F-29 is scheduled for 1983 and the first deliveries in 1985. Moreover, respect for these schedules is subject to the production go-ahead in the first half of 1981, a possibility that Fokker hinges on two events: gathering a substantial list of orders and creation of international coproduction for which negotiations are already in progress with potential partners in Europe, Japan and the United States. "But belief is increasing," the firm adds, " that these requirements will be met." Maximum attention was paid to the fuel-saving project and more generally to costs of operation, in a climate in which the energy efficiency of the new machines, by means of thorough studies of supercritical aerodynamics, applications of composite materials and automatic flight control systems, represents the only way to counteract the vicious spiral of the cost of kerosene. On a typical run of 925 kilometers, the F-29 would achieve 38 percent less fuel consumption per seat than the DC 9-30, or 18.5 percent less than the more recent DC 9-80. In standard formulas, the cost of operation per seat-kilometer, under 1985 estimated conditions, would, moreover, be 6.7 percent less than the DC 9-80 and 19 percent less than the Boeing 727-200 (with seating capacities of 142 and 155, respectively). An especially revised aerodynamic wing design with a moderate sweepback (21°) and an aspect ratio of 10 -- resulting from about 6 years of studies in the Dutch National Aerospace Research

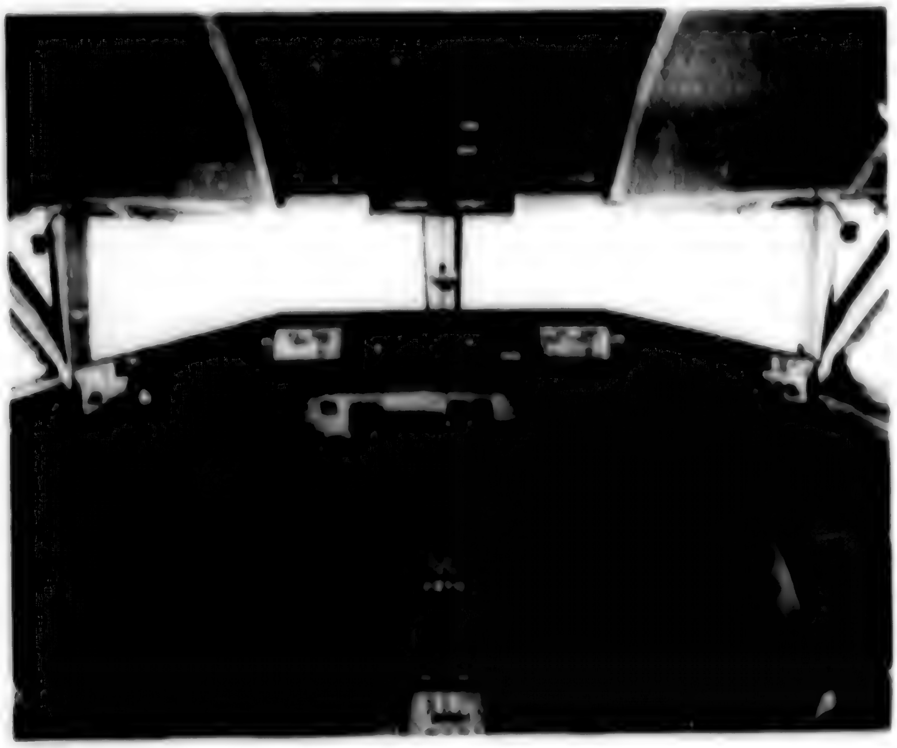
Center -- contributes to these results, indicative, at any rate, of the state of art pursuable by the new generation of commercial aircraft.

The same wing, which, in its present version, has an area of 108 square meters (offering, moreover, a specific takeoff weight not greater than 550 kilograms per square meter) and relative thicknesses ranging from 15.1 percent (root) to 11.3 percent (tip), has been perfected for an economical cruising speed of Mach 0.75.

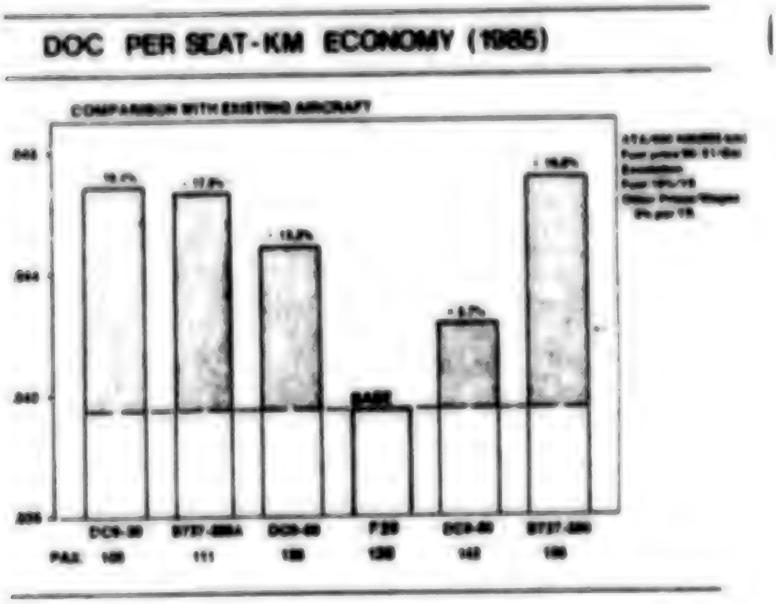
A weight cut comes from the composite materials in the secondary structures, with a saving of 500 kilograms in the same "zones" that undergo the adoption of composite materials on the Boeing 767 and determine their use standard on the new aircraft: movable wing and tail surfaces, nose cone, engine nacelles, landing gear doors. The tail cone on the F-29, which, just as on the F-28, overlaps on the typical airbrakes, is also made of composite. There are two engines, which, differing from the original design of the F-29, are now in an underwing position. Under consideration are the CFM 56-3 of CFM International (SNECMA [National Aircraft Engine Designing and Building Company]-General Electric) and the RJ 500 whose development has been started jointly by Rolls Royce and the Japanese. Both are in the 9,000-kilogram static thrust class, bypass ratio of 4.77:1 and bare weight 1,850 kilograms for the RJ 500, slightly lower than the same values for the same type Franco-American engine (5.10:1 and 1,920 kilograms). Under cruising conditions at Mach 0.75 and 35,000 feet, when the installed thrust is reduced to 1,800 kilograms, the specific consumption of these engines ranges around 0.65 kilograms per kilogram of thrust per hour by introducing on the "small" commercial aircraft a propulsion technology perfected in the largest turbofan engines. During airport operations, the aircraft thus equipped is, moreover, less noisy by about 10 EPN decibels than the present narrow-body aircraft. In the cockpit, things are changed in line with the times. There are cathode ray displays for primary flight and navigation, warning status, flight management system for improving the mission profiles.

With a load of 138 passengers, the F-29 has an autonomy of about 3,000 kilometers. A high-density arrangement in the cabin offers 156 seats (30-inch aisle), instead. The maximum inside width of the fuselage (bilobed) equals 3.56 meters and the cargo hold has a volume of 36.7 cubic meters. Maximum takeoff weight is 59,770 kilograms, zero fuel 50,800 kilograms and flight operational weight 34,000 kilograms.

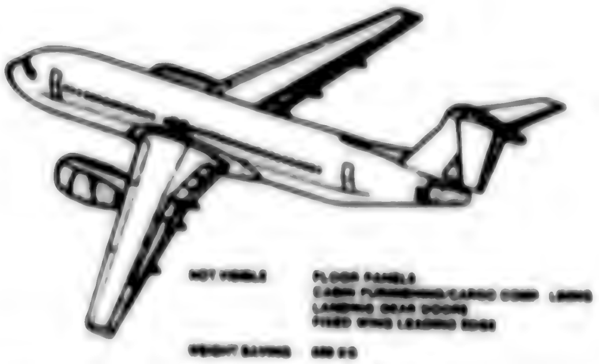
When twin jets, now 20 years old, have to be replaced, Fokker estimates a total market of 1,500 units. Now it is the turn of the more "modest" SA, sponsored by Airbus, to speak.



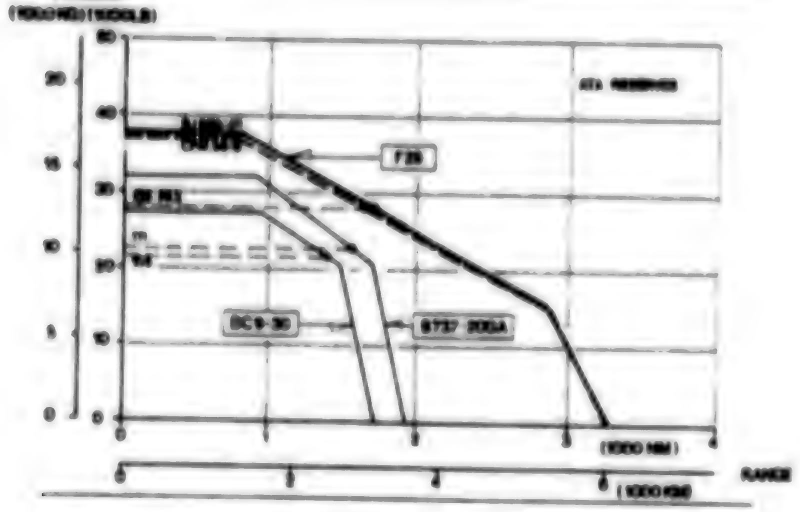
Mockup of the cockpit of the new Fokker twin jet.



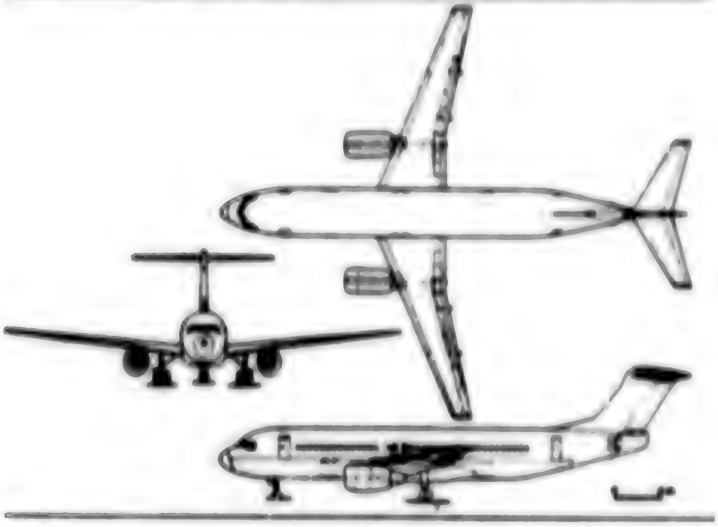
COMPOSITE USAGE ON F28



PAYLOAD - RANGE COMPARISON



F 29 GENERAL ARRANGEMENT



F29 LEADING PARTICULARS

Overall length	[illegible] m	([illegible] ft)	Max Take-Off Weight	[illegible] kg	([illegible] lb)
Overall height	[illegible] m	([illegible] ft)	Max Landing Weight	[illegible] kg	([illegible] lb)
Wing span	[illegible] m	([illegible] ft)	Max Zero Fuel Weight	[illegible] kg	([illegible] lb)
aspect ratio	[illegible]		Fuel Capacity	[illegible] kg	([illegible] lb)
sweep	[illegible]				
area	[illegible] m²	([illegible] ft²)			
			Engines	[illegible]	
Fuselage length	[illegible] m	([illegible] ft)		[illegible]	
height	[illegible] m	([illegible] ft)	Typical OWE ([illegible])	[illegible] kg	([illegible] lb)
width	[illegible]	([illegible] ft)	([illegible])	[illegible] kg	([illegible] lb)
			[illegible]	[illegible]	
Cabin length	[illegible] m	([illegible] ft)	First flight	[illegible]	
height	[illegible]	([illegible] ft)	In service	[illegible]	
width	[illegible] m	([illegible] ft)			
Cargo volume	[illegible] m³	([illegible] ft³)			
Wheel track	[illegible] m	([illegible] ft)			
Wheel base	[illegible] m	([illegible] ft)			

10,042
CSO: 3102

TRANSPORTATION

FIAT 127 DIESEL SMALLEST IN WORLD, AVAILABLE IN 1981

Milan L'UNITA in Italian 12 Jan 81 p 7

[Text] The 127-diesel (the smallest diesel engine built in the world) and some new versions of the Ritmo are the principal innovations that FIAT is preparing to put on the market in 1981.

The first innovation to come out on the market will be a version of the Ritmo with special fittings, In fact, within a couple of weeks, the Ritmo Super will be presented, offered with two types of engine: a 1,300-cubic centimeter (75 horsepower) engine and a 1,500 cubic centimeter (85 horsepower) engine. In comparison with the "normal" versions, the Super models will cost about 12 to 15 percent more.

The FIAT 127-diesel, which will probably be put on the market at the end of February, is completing its "fatigue" tests on the roads of the Langhe region.

On these hilly, rugged roads with considerable grades, the engine recorded -- as far as has been learned -- a diesel consumption of 1 liter per 20 kilometers. Consumption on "normal" roads whould, therefore, be lower.

The overall performance of the 127-diesel engines is comparable with the performance of the present 127 gasoline engine with a 903-cubic centimeter engine: maximum speed is 135 kilometers an hour.

The cylinder displacement of the new FIAT diesel engine is 1,300 cubic centimeters. The engine is derived from the gasoline engine in the 127-1050.

The new diesel engine should supplement the 127 series, which, at present, are the automobiles most sold in Italy with close to 220,000 units marketed in 1980.

The 127-diesel should apprear on foreign markets by the end of 1981.

In the spring, the Ritmo Sport with a 1,600-cubic centimeter (105 horsepower) engine will probably appear on the market. It may attain a speed of over 170 kilometers an hour. Finally, in autumn, the Ritmo series will be supplemented with a Ritmo Abarth, with a 2-liter engine (over 190 kilometers an hour).

10,042
CSO: 3102

AIRBUS ENTERS SECOND GENERATION WITH A300-600

Gelsenkirchen AEROKURIER in German Jan 81 pp 52-53

[Article by R. Doerpinghaus: "A300-600 Airbus -- Airbus Enters Second Generation"]

> [Text] The Airbus is entering the second generation. In addition to the A310 Airbus, the A300 B2/B4-600 Airbus is now taking shape at Airbus Industrie; complying with the A310 technology to a large extent, it is to replace the existing B2/B4 versions as of the mid-1980s. Technological features of the 600 version: FFCC [Forward Facing Crew Cockpit], improved systems and control elements as well as extensive use of composite fiber plastics. The maiden flight of the A300-600 Airbus is scheduled for July 1983. Reputable airlines have already publicized their interest in the 600 version. A few days before Christmas, Saudia was the first airline to order 11 Airbuses of the 600 version. AEROKURIER reported this purchase in November.

In the aircraft construction industry success has its own laws. Knowing and observing these laws is as much a determining factor of success or failure as is good or bad design. The problem is to make this issue known to outsiders--and politicians, in particular. Even if this is done successfully, another hurdle has to be overcome, i.e. the public who receive information from the daily press in bits and pieces, often totally distorted, and who on the basis of this information of tax funds is required for an aircraft like the Airbus, which is so much in demand now, in order to secure the future of this program, and at the same time to guarantee jobs and progressing know-how over decades.

If the Airbus is not to remain an ephemeral success of European aircraft construction, the program must not only be diversified, but also constantly adjusted to the technological state of the art.

In addition to the development of the small A310 Airbus, it is now becoming apparent that it will be necessary to modify the present B2/B4 basic designs of the A300 Airbus according to the latest state of the art. At Airbus Industrie the new Airbus generation is now taking shape in the form of the A300-600 Airbus, which is to replace the present B2 and B4 models of the A300 Airbus as of the mid-1980s.

Thus the introduction of the A300-600 Airbus to passenger service will take place shortly after the A310 commissioning scheduled for 1983.

The main purpose of the A300-600 development is the modification of the A300 Airbus to the state of the art of the A310 Airbus with maximum compliance of both designs with respect to cell, systems and operation, and an 8-percent reduction of direct operating costs.

In order to reach this goal, the A300-600 Airbus will have the following features based on the existing A300 B2/B4 design:

--A310 back fuselage; at the same time, extending the cabin to accommodate a larger number of passengers or more cargo;

--Increase in permissible disposable load;

--Reduction of resistance due to detailed aerodynamic redesign;

--Complete system digitalization as in A310, thus reducing the weight as constructed, reducing the maintenance requirements and increasing reliability and flexibility;

--FFCC, optional for 2- or 3-member crews, as known for A310 and under discussion;

--Basic system simplification and improvement, thus reducing weight and maintenance requirements and increasing reliability;

--Extensive use of composite fiber elements (reduces weight);

--Improved interior equipment in accordance with the new building standards for passenger and cargo decks which are to be expected;

--New engine versions of the basic types used so far, with reduced specific fuel consumption;

--New auxiliary turbine for APU systems.

Details may be seen from the illustrations. Based on the latest state of the art, Airbus Industrie assumes that approximately 1,500 kg of structural weight can be saved with the A300-600 design, as compared to the existing A300 B2 /B4 design.

According to Lufthansa, a reduction of the A300B4 structural weight by 1 kg only is equal to annual fuel savings of DM 91.00 based on current kerosene prices (also see AEROKURIER 11/80, p 1437).

Simultaneously, the payload gain as a result of the 1 kg weight reduction is quoted to amount to DM 170.00 p.a. for the A300B4 Airbus. Assuming these figures for the A300-600 Airbus, a weight reduction of approximately 1,500 kg results in fuel savings of DM 136,500 and a payload gain of DM 225,000 annually. With an increase in the price of energy, the figures quoted will increase accordingly.

Depending on the number of seats provided, the A300-600 Airbus will seat 267 passengers in mixed class configuration, 26 of these in First Class (2 + 2 + 2) and 241 in the Economy Class (2 + 4 + 2). If equipped for Tourist Class only, the 600 will seat 285 (2 + 4 + 2).

During the initial development phase Airbus Industrie plans on offering the A300-600 Airbus with the same maximum initial weight as the existing A300B4-200. At this point, however, the possibility of increasing the maximum initial mass by 5,000 kg is already under consideration; aerodynamically, this is readily feasible; it has to be examined from a structural standpoint, however.

As of mid-1982, the CF6-80C1 engines provided for the A300-600 will be tested in the United States with the prototype (serial number 3) owned by Airbus. In order to reduce the training costs and crew expenses, the A310 and the A300-600 cockpits will be designed in such a way that the planes can be flown by the same crews.

The A310 and A300-600 Airbuses are to be manufactured on the same final assembly line in Toulouse. For a certain transitional period, manufacture of the A300B2/B4 designs will be continued. This is especially important for those customers with a B2/B4 fleet who will give repeat orders for planes which will have to match the existing fleet.

The current rate of production of 3.3 aircraft per month is to be increased to 8 by 1984 and to 10 per month by 1985.

According to the existing schedule, the initial A300-600 rollout is scheduled for May 83. The maiden flight is scheduled for June 83, the licensing by March 84. Initial deliveries are scheduled as of March 84.

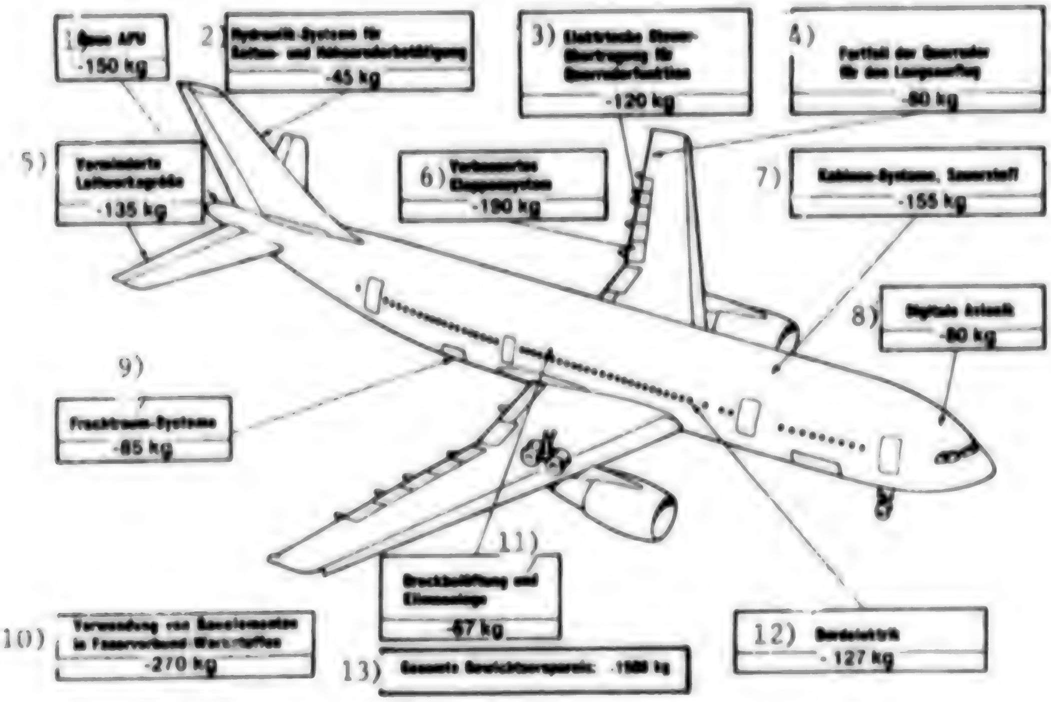
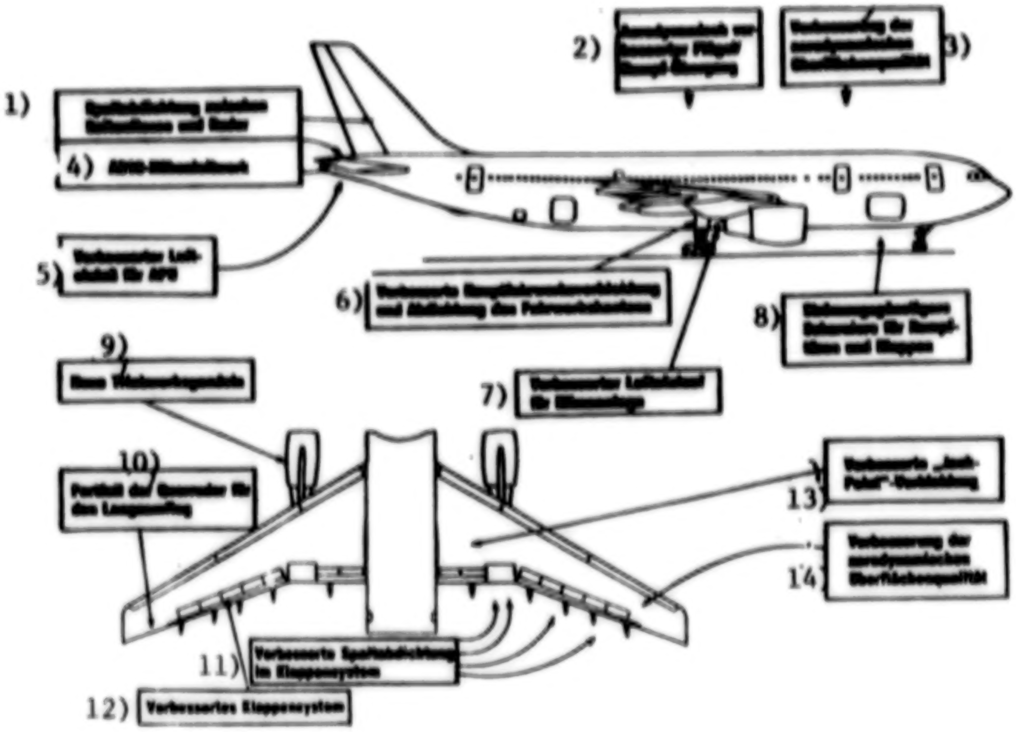

1) Neue APU -150 kg
2) -45 kg
3) -120 kg
4) -80 kg
5) Verminderte Leitwerksgröße -135 kg
6) Verbessertes Klappensystem -190 kg
7) Kabinen-Systeme, Sauerstoff -155 kg
8) Digitale Avionik -80 kg
9) Frachtraum-Systeme -85 kg
10) -270 kg
11) -67 kg
12) Bordelektrik -127 kg
13) -1500 kg

Figure 1. A300-600: Construction Weight Reduction Program

Key:

1. New APU
2. Hydraulic Systems for Operation of Side Rudders and Elevator
3. Electrical Control of Aileron Operation
4. Elimination of Ailerons for Slow Speeds
5. Reduction of Tail Unit Size
6. Improved Flap System
7. Cabin Systems, Oxygen
8. Digital Avionics
9. Cargo Compartment Systems
10. Use of Composite Fiber Elements
11. Pressurization, Ventilation and Air Conditioning
12. Electrical System Abroad
13. Total Reduction in Weight: 1,500 kg


1)
2)
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11) Verbesserte Spaltabdichtung im Klappensystem
12) Verbessertes Klappensystem
13)
14)

Figure 2. A300-600 Resistance Reduction Program

Key:

1. Aerodynamic Improvement of Wing/Fuselage Transition
2. Improved Aerodynamic Surface Quality
3. Sealing of Slot Between Tail Fin and Rudder
4. A310 Elevator Unit
5. Improved Air Intake for APU
6. Improved Main Landing Gear Lining and Sealing of Landing Gear Box
7. Improved Air Intake for Air Conditioning Unit
8. Fuselage Door and Flap Hinges Improved for Air Flow
9. New Engine Gondolas
10. Elimination of Ailerons for Slow Speeds
11. Improved Sealing of Flap System Slots
12. Improved Flap System
13. Improved Jack Point Lining
14. Improved Aileron and Surface Quality

Table. Comparison of Weight of A300B4-200 and A300B4-600

Maximum Initial Mass	kg	165,000	165,000
Maximum Landing Mass	kg	134,000	138,000
Maximum Mass Excluding Fuel (MZFW)	kg	124,000	130,000
Maximum Fuel *	kg	49,000	53,700*)
Idle Mass ex Works	kg	79,720	79,900
Airline Equipment	kg	8,838	9,180
Structural Mass	kg	88,558	89,080
Maximum Disposable Load	kg	35,442	40,920
Maximum Passenger Load	kg	24,405	25,855
Additional Cargo	kg	11,037	15,065
Wing Span	m	44.84	44.84
Length	m	53.62	54.08
Height	m	16.53	16.53

* On request

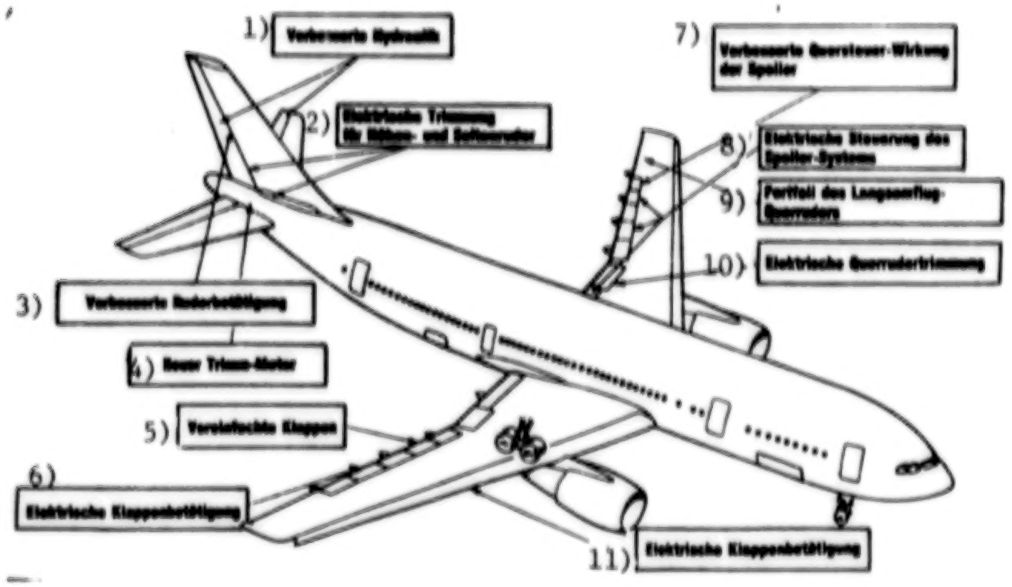
1) Verbesserte Hydraulik
2) Elektrische Trimmung für Höhen- und Seitenruder
3) Verbesserte Ruderbetätigung
4) Neuer Trimm-Motor
5) Vereinfachte Klappen
6) Elektrische Klappenbetätigung
7) Verbesserte Quersteuer-Wirkung der Spoiler
8) Elektrische Steuerung des Spoiler-Systems
9) Fortfall des Langsamflug-Querruders
10) Elektrische Querrudertrimmung
11) Elektrische Klappenbetätigung

Figure 3. A300-600: Improved Control Elements

Key:

1. Improved Hydraulic System
2. Electrical Trimming of Elevator and Side Rudder
3. Improved Rudder Operation
4. New Trimming Motor
5. Simplified Flaps
6. Electrical Operation of Flaps
7. Improved Aileron Effect of Spoilers
8. Electrical Control of Spoiler System
9. Elimination of Slow Speed Aileron
10. Electrical Aileron Trimming
11. Electrical Operation of Flaps

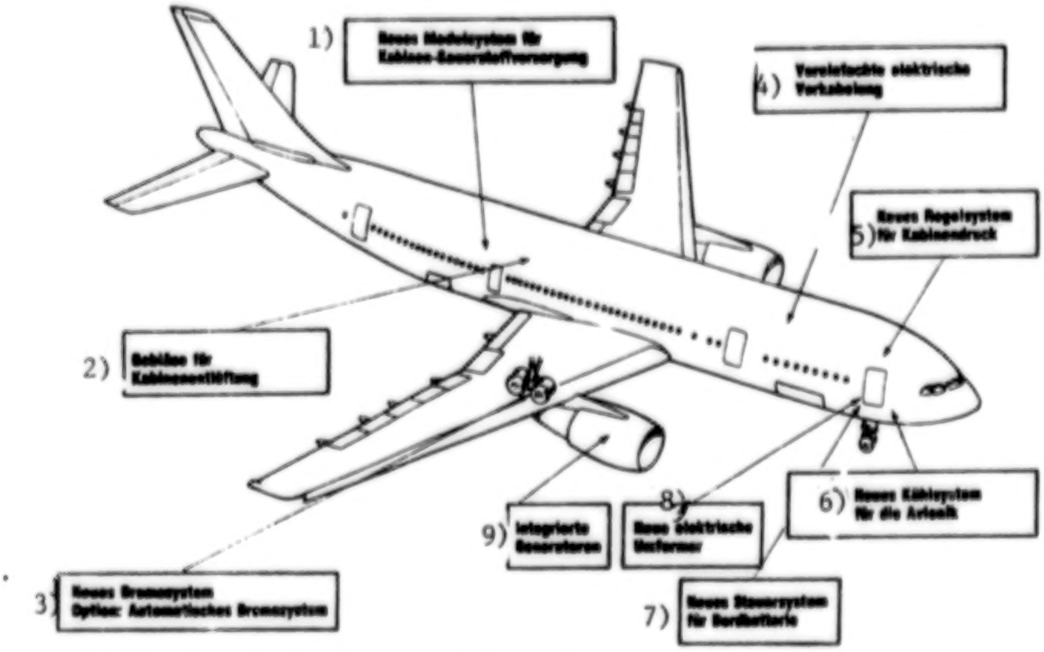
1) Neues Modulsystem für Kabinen-Sauerstoffversorgung
2) Gebläse für Kabinenentlüftung
3) Neues Bremssystem
Option: Automatisches Bremssystem
4) Vereinfachte elektrische Verkabelung
5) Neues Regelsystem für Kabinendruck
6) Neues Kühlsystem für die Avionik
7) Neues Steuersystem für Bordbatterie
8) Neue elektrische Umformer
9) Integrierte Generatoren

Figure 4. A300-600 System Improvements

Key:

1. New Modular System for Cabin Oxygen Supply
2. Cabin Ventilation Fan
3. New Braking System; Automatic Braking System Optional
4. Simplified Electrical Wiring
5. New Cabin Pressurization Control System
6. New Avionics Cooling System
7. New Battery Control System
8. New Electrical Converters
9. Integrated Generators

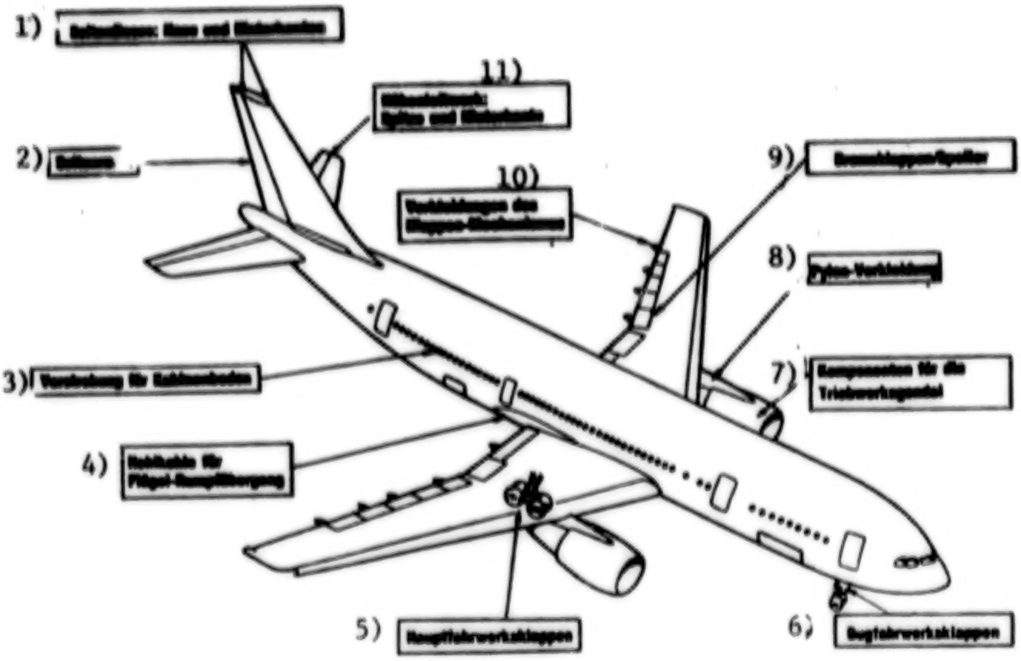

Figure 5. A300-600: Use of Composite Fiber Elements

Key:

1. Tail Fin: Nose and Back Edges
2. Side Rudder
3. Cabin Floor Bracing
4. Hollow Groove for Wing-Fuselage Transition
5. Main Landing Gear Flaps
6. Nose Landing Gear Flaps
7. Engine Gondola Components
8. Pylon Lining
9. Braking Flaps/Spoilers
10. Flap Mechanism Lining
11. Elevator: Tip and Back Edge

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9 March 1981